CSE

Course code	Course Name	Course Category	L-T-P	Credits
MA1102	Calculus and Linear Algebra (CSE)	B.Sc	3-1-0	4

COURSE LEARNING OBJECTIVES

The objectives of this course is to

1. Discuss the Solutions of first order differential equations.
2. Understand Continuity and differentiability of multi-variable functions
3. Discuss maximum and minimum of functions of several variables.
4. Discuss the linear transformation and its Eigen values and Eigen vectors.
5. Discuss numerical methods to find the roots of polynomial and transcendental equations Interpolating and Fitting the curves for data points.
6. Evaluate integrals by using numerical methods and solving IVP

Unit – I **(10 Contact hours)**

DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE: Basic concepts, Variable Separable method, homogeneous differential equations, Exact differential equations, Integrating factor, Differentiable equations Reducible to exact, Linear differential equations, Bernoulli differential equations.

Unit - II **(12 Contact hours)**

FUNCTIONS OF SEVERAL VARIABLES: Limit, Continuity and Differentiability of functions of several variables, Partial derivatives and their geometrical interpretation, Differentials, Derivatives of Composite and Implicit functions, Chain rule, Jacobians, Derivatives of higher order, Homogeneous functions, Euler's theorem, and Harmonic functions.

Unit – III **(8 Contact hours)**

APPLICATIONS OF FUNCTIONS OF SEVERAL VARIABLES: Taylor's expansion of functions of several variables, Maxima and Minima of functions of several variables - Lagrange's method of multipliers.

Unit – IV **(10 Contact hours)**

LINEAR ALGEBRA: Vector Spaces, Linear Combinations of Vectors, Linear dependence and Independence, Basis and Dimension, Linear Transformations, Matrix Representations of Linear transformation,

Unit-V **(10 Contact hours)**

MATRIX ALGEBRA (EIGEN VALUES AND EIGEN VALUES): Solving system of Homogeneous and Non-Homogeneous equations by using Gauss elimination method. Characteristic roots and Characteristic Vectors of a matrix - Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem.

Unit - VI **(10 Contact hours)**

NUMERICAL SOLUTION OF TRANSCENDENTAL EQUATIONS, INTERPOLATION: Roots of polynomial and transcendental equations – bisection method, Regula-falsi method and Newton-Raphson Method, Finite differences, Newton's forward and backward interpolation formulae, Gauss central difference Interpolation formulae.

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Course Code	Course Name	Course Category	L-T-P	Credits
20EE1109	Basic Electrical and Electronics Engineering	ESC	3-1-0	4

Course Learning Objectives

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology.
2. Provide knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
3. To explain the working principle, construction, applications of DC machines, AC machines.
4. Realize the importance of electronic devices in the present technology.

Course Content:

Unit-I **(13 Contact hours)**

DC Circuits: Parallel circuits, Star-delta and delta-star transformations, equivalent resistance calculation, Mesh and Nodal analysis, superposition theorem, thevenin's theorem and maximum power transfer theorem. Introduction, Basic definitions, Types of elements, Ohm's Law, Kirchhoff's Laws, Series.

Unit-II **(7 Contact hours)**

AC Circuits

Single-phase: Inductive circuits, capacitive circuits, series RL, RC and RLC circuits, resonance
Three-phase: star connection and delta connection.

Unit-III **(9 Contact hours)**

DC Machines

Generator: Principle of operation of DC Generator, EMF equation, types, applications **Motor:** DC motor types, torque equation, applications, three point starter.

UNIT-IV **(9 Contact hours)**

AC Machines

Transformers: Principle of operation of single phase transformers, EMF equation, losses, efficiency and regulation.
Induction Machine: Principle of operation of induction motor, slip-torque characteristics, applications.

UNIT-V **(9 Contact hours)**

Semiconductor Devices

Diode: types of semiconductors, P-N junction diode, V-I Characteristics, zener diode, Diode Applications. **Rectifiers:** Half wave, Full wave and Bridge rectifiers.

UNIT-VI **(7 Contact hours)**

Transistors

PNP and NPN Junction transistor, Transistor configurations, Transistor as an amplifier

Course Code	Course Name	Course Category	L-T-P	Credits
20CS1101	Problem Solving and Programming Through C	ESC	3-1-0	4

Course Learning Objectives:

1. To understand the various steps in Program development.
2. To understand the basic concepts in C Programming Language.
3. To learn about arrays and character arrays
4. To learn how to write modular and readable C Programs
5. To understand the basic concepts of Pointers and Dynamic memory allocation.
6. To understand the usage of Structure and Unions and about file operations

Course Content:

UNIT – I **(10 Contact hours)**

Introduction to Computer Programming: Computing Environments, Computer Languages, Creating and Running Programs. Algorithms and Flow charts :

Definition of Algorithms and examples, Introduction to C Language - Background, C Identifiers, Data Types, Operators, Variables, Constants, Input / Output, Expressions, C Programs, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.

UNIT-II **(10 Contact hours)**

Conditional Statements and Loops: if-else, switch Statements, Standard Functions. Repetition: loops, while, for, do-while statements, Loop examples, break, continue and GOTO statements.

UNIT-III **(8 Contact hours)**

Arrays: Array Concepts, Using Arrays in C, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays;

Strings: Declaring, Initializing, Printing and reading strings, string manipulation functions, String input and output functions, array of strings,

UNIT – IV **(12 Contact hours)**

Functions: Designing Structured Programs, Function Basics, User Defined Functions, Inter Function Communication, Standard Functions, Recursion- Recursive Functions, Preprocessor Commands. Strings - Concepts, C Strings, String Input / Output Functions, Arrays of Strings, String Manipulation Functions.

UNIT – V **(10 Contact hours)**

Pointers: Introduction, Pointers to Pointers, Compatibility, void Pointers, Arrays and Pointers, Pointer constants, Pointers and Strings, Pointers to Functions, Pointers to Constant Objects, Constant Pointers, Pointer Arithmetic. Call-by-reference: Pointers for Inter-Function Communication, Passing Arrays to a Function.

Dynamic Memory Allocation: Memory Allocation Functions, Programming Applications, Command-line Arguments.

UNIT – VI **(10 Contact hours)**

The Type Definition (type def), Enumerated Types .

Structure& Union: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self-Referential Structures, definition and Initialization of Union, Accessing of Union.

Files: Input and Output: Files, Streams, Standard library Input Output Functions, Character Input Output Functions.

Year & Sem: E1 & SEM1	Course Code: 20EG1181	Course Name: ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I	L – T -P: 1 – 0 – 3	Credits 2.5

Course objectives:

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To provide opportunities for practice in using English in day to day situations
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for debate, group discussion and public speaking

COURSE CONTENT

UNIT-I: **(06 Contact Hours)**

Theory: An Ideal Family by Katherine Mansfield

Spoken Skills: Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Giving directions

UNIT-II: **(06 Contact Hours)**

Theory: Energy -Alternative sources of Energy

Panel Debate on "On-grid & off-grid support to public participation in the production of solar energy in India", Reading the Wikipedia content on "The Green New Deal". Reflective session on the prospects of "The Green New Deal in India"

Writing Skills: Letter Writing (Formal & Informal) and Hands on Session on Letter Writing

UNIT-III: **(06 Contact Hours)**

Theory: Transport - Problems & solutions

Group Discussion on "The Future of Bullet Trains in India"

PPT on "The Dedicated Freight Corridors & the Future of Indian Economy" – Introduction to Speech

Spoken Skills: Sounds – Vowels, Consonants and Diphthongs – Pronunciation Exercises (Basic Level)

UNIT-IV: **(06 Contact Hours)**

Theory: Technology - Evaluating technology

PPT on "3R: Reduce, Recycle, Reuse" - Solo Debate on "Can Block Chain Technology Mitigate the Issue of Cyber Crimes and Hacking?"

Presentation Skills: JAM –Description of Pictures, Photographs, Process, Talking about wishes, Information Transfer

UNIT-V: **(06 Contact Hours)**

Theory: Environment - Ecology versus Development

Listening Skills: Listening Activity on YouTube video on "Greening the Deserts" - Students' seminar on "Waste to Wealth: Examples from around the Globe".

UNIT-VI: **(06 Contact Hours)**

Theory: Industry - Selling products

Reading Skills: Reading the material on "4Ps: Product, Price, Place, and Promotion" Role play on "How to sell your product and services"

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INDIAN CONSTITUTION

Course code	Course name	Course Category	L-T-P	Credits
20HS1101	Indian Constitution	MC	2-0-0	0

Course Learning Objectives:

1. The basic objective of the course is to provide knowledge about institutions
2. It help to understands the processes to governing the society in a systematic way.
3. It helps to establish social Justice, Liberty, Equity and Fraternity.
4. The course will introduce the idea of political system in general
5. It provides idea about working process of constitutional institutions.
6. To create awareness about the functioning of the judicial system in India.

Course Contents:

UNIT I: **(5 hours)**

Introduction-Constitution' meaning of the term, Indian constitution sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and duties, Directive Principles of State Policy.

UNIT II: **(5 hours)**

Union Government and its Administration-Structure of the Indian Union: Federalism, centre-state relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok sabha, Rajya sabha.

UNIT III: **(5 hours)**

Election commission- Election commission: Role and functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

UNIT IV: **(3 hours)**

State Government and its Administration- Governor: Role and position, CM and Council of ministers, state secretariat: Organization, structure and functions.

UNIT V: **(7 hours)**

Local Administration-District's Administration head: Role and importance, Municipalities: Introduction, Mayor and role of Elected Representatives, CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Position and role, Block level: Organizational Hierarchy (different departments), Village level: Role of elected and appointed officials, Importance of grass root democracy.

UNIT VI: **(5 hours)**

Union Judiciary-Establishment and constitution of Supreme court, Appointment of Judges, Establishment of State High court, Establishment of common High court for 2 or more states, WRITS, PIL(Public Interest Litigation).

Learning resources

Text book:

1. Durga Das Basu, *Constitutions of India*, 23rd ed, LexisNexis Publication.

Reference Books:

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Course Code	Course Name	Course Category	L-T-P	Credits
20EE1180	Basic Electrical and Electronics Engineering Laboratory	ESC	0-0-3	1.5

Course Learning Objective:

1. To make student get familiarized with the electrical and electronic measuring equipment.
2. To make understand the student the concepts of characteristics of Resistors, Capacitors and Inductors.
3. To understand the behaviour of electrical equipment.
4. To understand the concepts of diodes, transistors and amplification.

List of Experiments:

Familiarization with Computer Hardware and software installation, DSO, Function generators, RPS, FPS, Mustimeters and other lab equipment

Section A: Computer Hardware and software installation:

1. Every student should Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.
2. Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.
3. Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.
4. Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition

Section B: Electrical Engineering Laboratory:

1. Verification of ohm's law, series and parallel circuits
2. Verification of Kirchhoff's Laws
3. Verification of Voltage division and Current division principles
4. Verification of circuit theorems
5. V-I characteristics of Incandescent and CFL lamp
6. V-I characteristics of Fluorescent lamp
7. A.C analysis of series R-L circuit and R-C circuit
8. Calibration of Energy meter
9. Open circuit characteristics of D.C Generator
10. Speed control of D.C shunt Motor
11. Three phase power measurement
12. Lab project

Section C: Electronics Engineering Laboratory:

1. Familiarization with any CAD tools like multisim/Pspice/ngspice for doing basic experiments .
2. V-I characteristics of a P-N junction diode and zener diode
3. Half wave and center tapped full wave rectifier
4. Full wave bridge Rectifier with and without filters.
5. Design of a simple amplifier using BJT
6. Experiment on simple analog-modulation scheme
7. Simple experiment on Arduino kit and interfacing with sensors
8. Lab project

Course Code	Course Name	Course Category	L-T-P	Credits
20CS1181	Problem Solving and Programming Through C Lab	ESC	0-0-3	1.5

Course Learning Objective:

1. Identify situations where computational methods and computers would be useful.
2. Given a computational problem, identify and abstractthe programming task involved.
3. Approach the programming tasks using techniques learned and write pseudo-code.
4. To understand the concepts of Programming language
5. To learn the basics of C declarations, operators and expressions
6. To learn on the manipulation of strings, functions and pointers
7. To apply concepts and techniques for implementation

List of Programming Assignments for Laboratory:

Statements, Expressions & Conditionals

1. Write a program to print the memory allocation required for all the datatype in C Language.
2. Write a program to check whether the given number is even number or odd number.
3. Write a menu based program to take of input of two values followed input of choice and accordingly perform arithmetic operations like Addition, Subtraction, Multiplication, Modulus, Division, Power(Using Switch Statement)
4. Write a program to swap two given numbers with and without using extra variable.
5. Write a program to find out the whether the given number is a perfect square or not.
6. Write a program to find out whether the given number is positive, negative or zero value.

Iterative Constructs - I: For Loop, While Loop &Do. While

1. Write a program print all the factors of a given number
2. Write a program to find the factorial of a given number
3. Write a program to find whether a given number is Palindrome or not.
4. Write a program to find whether a given number is Prime or not.
5. Write a program to print the Fibonacci series upto given 'n' number of terms.

Iterative Constructs – II: Nested Loops

1. Write a program to print the first 'n' prime numbers and prime numbers upto 'n' value.
2. Write a program to print the Pascal Triangle for given 'n' value
3. Write a program to print the first 'n' perfect number for a given 'n' value.
4. Write a program to print the following pattern for given 'n' value.
5. For Eg. If n = 3, the output would be

```
        *
    *   *   *
*   *   *   *   *
    *   *   *
        *
```

6. Write a program to print the following pattern for given 'n' value
   For Eg. If n = 4, the output would be

```
        2
            3   5
        7   11  13
17      19  23  29
```

Single Dimensional Arrays: Basic Operations and Problems

1. Write a program to take an input array of 'n' numbers and find out the sum of all the elements, product of all the elements and mean of the array.
2. Write a program to take an input array of 'n' numbers and print the second smallest and second largest element of all elements in the array.

Two Dimensional Arrays –Matrices& its operations

1. Write a program to find the addition and subtraction for the given two matrices of sizes 'M x N' and 'P x Q' respectively
2. Write a program to find the multiplication of the given two matrices of sizes 'M x N' and 'P x Q' respectively.
3. Write a program to find transpose of a matrix.

Strings – Dealing with non-numerical data

1. Write a program to convert the Lower Case letters to Upper Case Letters and Upper Case Letters to Lower Case Letters in a given input string.
2. Write a program to the print out the number of vowels, consonants, and digits (0-9) present in the given input string.
3. Write a program to check whether the given input string is palindrome string or not
4. Write a program to sort the given string of characters.

Array of Strings

1. Write a program to find the strings starting with "c" and "a" for the given n input strings..
2. Write a program to print the words of given input string in reverse order For
   Eg. If input string is "I am an Indian", the output would be "Indian an am I"
3. Write a program to arrange the given 'n' strings in Dictionary Order.

Functions

1. Write a program to implement the string operations like Length of String, String Copying, String Concatenation, Conversion to Uppercase and String Comparison.(Define own Function for each of the operation. Header file "string.h" is not allowed)

2. Write a C program to implement Multiplication and Division Operations without using operators "*" and "\" respectively. Define function "mul" for multiplication and "div" for integer division.

Recursion

1. Write a program to print the integers from 1 to N and then N to 1 for the given input number 'N' without using any loops.
2. Write a program to find the X power N(X^N) using the user defined recursive function "pow(X,N)" without using any predefined function from the library.
3. Write a program to find the GCD of two numbers 'a' and 'b' by defining a recursive function GCD(a,b).

Structures

1. Write a program to take the information of 'n' Students (REGID, Name, CGPA, Address – Village, District, Phone NO) and print the topper among the n students.
2. Write a program to take the information of 'n' Students (REGID, Name, CGPA, Address – Village, District, Phone NO) and print the students in the ascending order of Regn ID.
3. Write a program to take the information of 'n' Students (REGID, Name, CGPA, Address – Village, District, Phone NO)and print the list of Phone Number for the students who are the above average of CGPA.

File Handling – Create, Read and Write operations on File

1. Write a program to print the number of lines and words in a given input file name.
2. Write a program to copy from the given file to another file.
3. Write a program to append one file at the end of another file.
4. Write a program to search for a word in a given text file.

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ENGINEERING FIRST YEAR: SEMESTER-2

Course code	Course Name	Course Category	L-T-P	Credits
20MA1202	Discrete Mathematics	BSC	3-1-0	4

Course learning objectives: The objective of this course is to

1. Develop mathematical maturity of students to build the ability to understand and create mathematical arguments and to teach them how to think logically and mathematically.
2. Prove theorems and Mathematical arguments by using different methods. provide the mathematical foundations for many computer science courses including data structures, algorithms, database theory, automata theory, formal languages, compiler theory, computer security and operating systems.
3. Learn the basic properties of sets and how to work with discrete structures, which are abstract mathematical structures used to represent discrete objects and relationship between these objects.
4. Introduce basic techniques of counting so that they develop the ability to enumerate..
5. Learn the concepts of graphs and its properties, solving real world problems by using graph concepts.
6. Learn the concepts of Euler Paths , graph coloring , trees.

Course Content:

Unit – I **(10 Contact hours)**

Propositional logic:
Propositions and Connectives, well-formed formulas, Logical Equivalence and laws of logic,Normal forms, PCNF, PDNF.

Unit - II **(10 Contact hours)**

Proof techniques:

Tautological implications and rules of inferences, Methods of proofs(Forward proof, proof by contradiction, contra positive proofs, proof of necessity and sufficiency, Proof by Mathematical induction)

Unit - III **(12 Contact hours)**

Sets, relations and functions:
Sets, Relations, Equivalence Relations and compatibility relations, Transitive closure, Posets, Finite and infinite sets, countable and uncountable sets (definitions), Functions.

Unit - IV **(12 Contact hours)**

Introduction to counting:

Counting Principles, Pigeon hole Principle, Permutations and Combinations, Recurrence Relations, Linear Recurrence relations, Generating functions.

Unit - V **(9 Contact hours)**

Introduction to Graph Theory:
Graphs and their basic properties, Special types of graphs and representations of graphs, Isomorphism's, connectivity.

Unit – VI
Graph Theory(Continuation) : **(7 contact hours)**
Euler and Hamiltonian Paths, Planar Graphs, Graph coloring, Trees

Course code	Course name	Course Category	L-T-P	Credits
20PY1201	E1 Engineering Physics-CSE	BSC	3-1-0	4

Course Learning Objectives:

1. To enhance the knowledge on waves & oscillation with an emphasis on different type of oscillations and its resonance conditions.
2. To distinguish vividly the Optical phenomena's such as Interference, Diffraction and their applications through experimental point of view like Michelson Interferometer, Newton Rings and Plane Diffraction Grating.
3. To pursue the in-depth knowledge on Polarization with emphasis on Laurent's half-shade Polarimeter and also to learn all the basic necessary concepts regarding the LASERs including basic important types of LASERs.
4. To pull the student attention towards the difference between Photography and Holography and also the basic knowledge regarding Optical fibers along with its applications.
5. To identify the necessity of origin of Quantum mechanics over the grand old Classical mechanics and also to learn the knowledge on postulates of Quantum mechanics.
6. To get knowledge about the band theory of solids by the assumption of movement of an electron in the periodic potential well only and hence distinguishes the materials classification, phenomena of Hall Effect exhibited by semiconductors and its applications.

Course Content:

Unit I: Oscillations **(8 Hours)**

Oscillations: Simple Harmonic Oscillator (SHO), Damped Oscillations, Forced Oscillations, Amplitude and Velocity Resonance, Quality Factor, Coupled Oscillations &Normal modes, Coupled Pendulums & energy and Oscillation on N coupled modes.

Unit – II: Wave Optics **(10Hours)**

Interference: Superposition principle, Division of amplitude and wave front division, Interferometers (Michelson), Newton's Rings due to Reflected waves, Applications; Diffraction: Fraunhoffer diffraction (single, double & multiple slits),Plane Diffraction Grating, Rayleigh criterion for resolving power, Dispersive power, Applications.

Unit – III: Polarization and LASERS **(9 Hours)**

Polarization: Classification of Polarized light: Linear, Circular, Elliptical; Production & detection of polarized light; Retardation wave plates: Quarter & Half wave plates; Optical activity: Laurent Half shade Polarimeter; Basic principles of Lasers, Theory of Lasers, and Types of Lasers: Three level and four level lasers, Ruby Laser, He-Ne Laser, and Semiconductor laser: P-N Junction Diode Laser, applications of lasers.

Unit – IV: Holography, and Optical fibers **(9 Hours)**

Basic principles of Holography, types of holograms, difference between photography and holography, holographic NDT &applications of holography; Optical fibers: Basic principles, types and applications for communication and sensing, Acceptance angle &Numerical Aperture NA.

Unit V: Quantum Mechanics **(12 Hours)**

Photo electric effect, Compton effect; De-Broglie matter waves, properties of matter waves, Uncertainty Principle, Wave function& it's probability interpretation, Operators, Expectation values, Postulates of quantum mechanics, Time independent Schrodinger Equation and its Applications, Particle in a box (1-D and 3-D).

Unit VI: Semiconductor Physics **(12 Hours)**

Electron in periodic structures, Band theory of solids, E-K curve, effective mass, Density of states, Fermi levels. Intrinsic and extrinsic semiconductors, dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect- Hall sensors, Physics of p-n junction, Metal-semiconductor junction (Ohmic and Schottky)

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course code	Course name	Course Category	L-T-P	Credits
20BM1201	Managerial Economics and Financial Analysis	HSC	3-0-0	3

Course Learning Objectives:

1. To strengthen students managerial skill.
2. To enhance the conceptual clarity in economic concepts.
3. To develop to forecasting capability.
4. It will help to produce multi-disciplinary thought.
5. It will enhance their conceptual and practical/hand on practice in accounting.
6. It will help to implement and understand the uses of ratios.

Course Contents:

Unit I: **(7 hours)**

Introduction to managerial economics, consumer behavior, demand, demand analysis, demand forecasting, supply, supply analysis.

Unit II: **(7 hours)**

Theory of production, production functions, concept of cost, cost analysis, break even analysis.

Unit III: **(7 hours)**

Market structure-monopoly, oligopoly, monopolistic, prefect market; Types of business organizations-sole proprietorship, partnership, private ltd. Companies and public ltd. Companies, formation of company.

Unit IV: **(8 hours)**

Introduction to capital, capital sources, capital budgeting- NPV, IRR, Payback period, profitability index.

Unit V: **(8 hours)**

Introduction to financial accounting, rules of debit-credit, Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments, Preparation of final account and other related accounting statements.

Unit VI: **(8 hours)**

Financial statements, comparative statement analysis, common- size statement analysis, ,ratio analysis, time series (only theories).

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Course code	Course Name	Course Category	L-T-P	Credits
20CS1201	Object Oriented Programming through JAVA	PCC	3-1-0	4

Course Learning Objectives:

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.,
2. Understanding the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms.
3. Understand the principles of inheritance, packages and interfaces.
4. Understand the principles of Multithreading and Event handling mechanisms.

Course Content:

Unit 1: (7.5 Contact hours)

Introduction: Object Oriented Programming, Introduction to java and JVM, Key features, Fundamentals of Objects and Classes, Access Specifiers, data types, dynamic initialization, scope and life time, operators, Conditional Statements, control structures, arrays, type conversion and casting. Constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.

Unit II: (7.5 Contact hours)

Strings: Exploring the String class, String buffer class, Command-line arguments. Library: StringTokenizer, Random class, Wrapper classes. Encapsulation: Abstraction. Creating User defined Data Structures: Array of Objects, User defined Linked List.

Unit III: (10 Contact hours)

Inheritance and Interface:Types of Inheritance, usage of super key word, method overriding, final methods and classes, abstract classes, Polymorphism: dynamic method dispatch, Static method dispatch. **Interfaces**: Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

Unit IV: (6 Contact hours)

File Handling: Streams, File class, File streams. File Reader, File Writer, Buffered Reader, Buffered Writer, String Tokenizer **Exception Handling:** Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

Unit V (6 Contact hours)

Packages: Creating a Package, setting CLASSPATH, Access control protection, importing packages.**Multithreading :** Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

Unit VI (8Contact hours)

Event Handling: Introduction to Event Handling, AWT Components, windows, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menu bar. **Swings**: swings introduction, JFrame, JPanel and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons. Combo boxes, Action Listeners. Introduction to JDBC.

Course Code	Course Name	Course Category	L-T-P	Credits
20CS1202	Data Structures	PCC	3-0-0	3

Course Learning Objectives:

1. To understand the basic concepts such as Abstract Data Types, Linear, and Non Linear Data structures
2. To understand the behavior of data structures such as stacks, queues
3. To understand building of trees and its operations
4. To be familiar with searching and sorting algorithms
5. To choose the appropriate data structure for a specified application.
6. To study various graph processing algorithms and Algorithm Design technique

Course Content:

Unit- I **(7 Contact Hrs)**

Introduction to Linear and Non-Linear data structures. Singly Linked Lists-Operations-Insertion, Deletion, Searching, Concatenation of singly linked lists, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations Insertion, Deletion, Searching.

Unit- II **(8 Contact hours)**

Stack ADT, definition, operations, array and linked implementations in C, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition and operations, array and linked Implementations in C, Circular Queues-Insertion and deletion operations, Deque (Double ended queue) ADT, array and linked implementations in C.

Unit- III **(9 Contact hours)**

Sorting-Insertion Sort, Selection Sort, Merge Sort, Quick sort, Heap Sort, Comparison of Sorting methods and linear sorting algorithms-Counting sort, Radix sort, shell sort

Searching – Linear Search, Binary Search, Basic Concepts- Hashing Methods- Collision Resolutions- Open Addressing- Linked List Collision Resolution- Bucket Hashing

Unit- IV **(6 Hrs)**

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap, Min-Heap-Operations on Min-Heap.

Unit- V **(9 Contact hours)** Search

Trees-Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees-Definition and operations on AVL Tree, Red Black Trees, Trie Tree, B and B+ -Trees.

Unit- VI **(6 Contact hours)**

Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals – DFS and BFS. Applications of DFS and BFS-Connected Components, Topological sort.

Text Books:

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Course code	Course name	Course Category	L-T-P	Credits
20BE1201	Environmental Science	Mandatory	2-0-0	0

Course Learning Objectives:

1. To provide knowledge about multidisciplinary nature of environment, various sources of natural energy.
2. Understanding of ecosystem structure and function etc.
3. Knowledge of biodiversity and conservation
4. Understanding of problems caused by pollution and its impact
5. Understanding about the various social issues related to environment.
6. Awareness for the Environment and human health

Course Content:

UNIT-I: The Multidisciplinary Nature of Environmental Studies and Natural Resources (9 hours)

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance; Need for public awareness.

Natural Resources: Renewable and Non Renewable Resources

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resoureces for sustainable lifestyles.

UNIT-II: Ecosystems (4 hours)

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers,Energy flow in the ecosystem,Ecological succession, Food chains, food webs and ecological pyramids,Introduction, types, characteristic features, structure and function of the following ecosystem:-a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT-III: Biodiversity and It's Conservation (4 hours)

Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical classification of India,Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, Inida as a mega-diversity nation, Hot-sports of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-IV: Environmental Pollution (6 hours)

Cause, effects and control measures of:-a. Air pollution, b. Water pollution, c. Soil pollution, d. Marine pollution, e. Noise pollution, f. Thermal pollution, g. Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

UNIT- V: Social Issues and the Environment (4 hours)

From Unsustainable to Sustainable development Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rahabilitation of people; its problems and concerns. CaseStudies, Environmental ethics: Issues and possible solutions.• Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

UNIT-VI: Human Population and the Environment (3 hours)

Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Course code	Course Name	Course Category	L-T-P	Credits
20CS2181	Object Oriented Programming Through JAVA Lab	ESC	0-0-3	1.5

Course Learning Objective:

1. To build software development skills using java programming for real-world applications.
2. To understand and apply the concepts of classes, packages, interfaces, arraylist, User defined Linked List, File Handling, exception handling and Multi-threading.
3. To develop applications using AWT programming and event handling.

List of Experiments:

1. Lab No 1: Basic Programs in JAVA
2. Lab No 2: Programming Assignments on Arrays and Strings
3. Lab No 3: Programming Assignments on Classes, Objects and Encapsulation
4. Lab No 4: Implementing the concepts of Inheritance and Array Objects
5. Lab No 5: Implementing the OOPS Concepts of Abstract, Interfaces and Polymorphism
6. Lab No. 6: Programming Assignments on File Handling
7. Lab No. 7: Programming Exercises on Exception Handling
8. Lab No 8: Working with List Operations
9. Lab No 9: Implementing the concepts of Multi-Threading
10. Lab No 10: Programming Exercises on Event Handling

Course Outcomes

At the end of the course, the student will be able to

CO 1	Understanding the control structures and conditional statements in Java
CO 2	Understanding the arrays and String handling in java
CO 3	Understanding the difference between class and object and providing security for objects
CO 4	Understanding the reusability of objects and working with multiple objects
CO 5	Understanding about hiding the data, getting multiple inheritance through interfaces
CO 6	Understanding the data processing from files
CO 7	Understanding about handling run time abnormal program executions
CO 8	Understanding about creating user defined linked list and dynamic objects
CO 9	Understanding the multi-threaded programming and inter thread communication
CO 10	Understanding about GUI creation

Assessment Method

Assessment Tool	Experiments	Report/Viva-Voce/ Quiz/MCQ/Lab project	Total

Course code	Course name	Course Category	L-T-P	Credits
20PY1281	Engineering Physics Laboratory	BSC	0-0-3	1.5

Course Learning Objectives:

1. To determine the wavelength of laser light using Diffraction Grating.
2. To determine the radius of curvature of a Plano convex lens by Newton's Ring experiment.
3. To determine the specific rotation of cane sugar solution with the help of Polarimeter.
4. To calculate the velocity of ultrasonic sound waves in different liquid media by interferometer.
5. To study the phenomena of Hall Effect in given semiconductors and to calculate:-(i) The Hall Coefficient (R_H) (ii) the concentration of charge carriers of given semiconductor material.
6. To verify the postulates of Bohr's theory and discrete (quantized) energy level of atoms.
7. To study the photoelectric effect and determine the value of Plank's constant.

8. To determine the Energy Band Gap of a Semiconductor by using a Junction Diode / Four Probe method
9. Study of I-V Characteristic of a solar cell illuminated by an incandescent lamp at different fixed frequencies.
10. Determination of Acceptance angle and Numerical Aperture using fiber optic cable

Experiments list

1. Laser Diffraction
2. Newton's Ring expt
3. Polarimeter.
4. Ultrasonic interferometer
5. Hall Effect
6. Frank Hertz
7. Photo electric Effect
8. Energy Band Gap of a Semiconductor
9. Solar cells
10. Optical fiber

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Course Code	Course Name	Course Category	L-T-P	Credits
20CS1282	Data Structures Lab	PCC	0-0-3	1.5

Course Objectives:

1. To develop skills to design and analyze simple linear and non-linear data structures
2. To strengthen the ability to identify and apply the suitable data structures for the given real-world problem
3. To gain knowledge in practical applications of data structures.

List of Experiments:

1. Write a C program that uses functions to perform the following:
   a) Create a singly linked list of integers.
   b) Delete a given integer from the above linked list.
   c) Display the contents of the above list after deletion.
2. Write a C program that uses functions to perform the following:
   a) Create a doubly linked list of integers.
   b) Delete a given integer from the above doubly linked list.
   c) Display the contents of the above list after deletion.
3. Write a C program implement the Stack ADT using Arrays and Linked List.
4. Write a C program that uses stack operations to convert a given infix expression into its postfix equivalent.
5. Write a C program that evaluates a postfix expression.
6. Write C program to implement queue ADT using array and doubly linked list.
7. a) Write C program to implement priority queue ADT using array.
   b) Write C program to implement circular queue ADT using array.
8. Write C program for implementing the following sorting methods:
   b) Insertion sort b) Merge sort
9. Write C program for implementing the following sorting methods:
   b) Quick sort b) Selection sort
10. Write a C program for implementing Heap sort algorithm.
11. Write a C program that uses functions to perform the following:
    a) Create a Binary Search Tree (BST).
    b) Insert data in BST

b) Traverse the above BST recursively in Postorder.

12. Write a C program that uses functions to perform the following:
    a) Deletion an element BST
    b) Traverse the above BST non recursively in Inorder.

13. Write a C program to implement all the functions of a dictionary (ADT) using hashing.
14. Write C program for implementing Depth first traversal and Breadth first traversal.